NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

TECHNICAL MEMORANDUM 23

BRITISH CERTIFICATES OF AIRWORTHINESS.

Taken from

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May, 1921.

CERTIFICATES OF AIRWORTHINESS.

In order that an aircraft may receive a Certificate of Airworthiness, it must comply with the following requirements:

1. Its design - including the design of its components - must be approved as satisfying the requirements of safety in regard to both strength and stability.

2. It must be constructed of approved materials and by workmanship of approved quality.

In order that such certificate may be valid on any particular occasion;

1. The aircraft must be examined before flight and periodically overhauled by a competent person duly licensed as such by the Air Ministry, and

(2) It must be so loaded that its total weight does not exceed a given maximum, and its center of gravity must be situated within certain given limits.

Pamphlet A.N.D.1 gives in sections 3 and 4 the general rules brought out when civil flying began in May, 1919.

A. Strength of Design.

1. Types of aircraft used during the war, when modified for civil use are accepted as of adequate strength for a given maximum load, provided that any modifications that affect the safety of the aircraft are approved, and that the machine is first overhauled by a competent person.

3. As regards new types of aircraft, experience gained during the war had caused continual alteration and development in the methods of specifying and calculating load factors.

A committee was therefore convened to lay down a standard basis upon which designers could work; a copy of the report of this committee is attached.

In the meantime, new designs were checked on the general lines in use towards the close of the war.

Since March 1, 1920, the report of the above committee has been used as the basis upon which the load factors of new designs have been determined, with certain minor modifications, e.g., strength of undercarriages. Experience is now sufficient to permit of a revision of the present basis, and such revision will shortly be undertaken by a committee, upon which the industry will be represented, as it was on the original committee.

At the present time, when the load factors are checked, the size of the part concerned is also studied to determine if its dimensions are adequate. In addition the details of the design are also criticised and modifications, if necessary, specified, e.g., size of radiator, petrol system, etc. Consideration is now being given to possible devolution of responsibility in these matters.

B. Engines.

In order that a machine may receive a Certificate of Airworthiness, its engine must be approved.

In the first case engines approved for use in the war were approved for civil use. Then in consultation with the industry, a schedule of tests was laid down - of which a copy is attached - by the satisfactory performance of which an engine of new type or new construction may receive approval.

A similar schedule has also been prepared in respect of magnetos, but this has not yet reached its final form for publication.

C. Materials and Workmanship.

Standard specifications have been drawn up to cover the various materials used in aircraft. An index is attached to these specifications, which may be obtained from the address shown thereon.

The ensuring that the materials and workmanship employed are of an adequate standard is a matter of inspection. This inspection is carried out by either:

1. The Aeronautical Inspection Department of the Air Ministry;

2. The constructing firm, when its system and staff for the purpose have been approved; a general supervision being exercised by A.I.D.;

3. A combination of the above, e.g., the firm's inspection arrangements, may be approved as regards woodwork and erection, but not as regards metal parts.

D. Stability.

Normally the stability and effectiveness of controls can be determined within reasonable limits from the drawings of a new

type aircraft.

An actual flying test is, however, carried out by an official pilot after the constructor has completed his flying tests. This test is normally carried out at an airdrome convenient to the constructor. The full official trials at a Government testing station specified in Section 3, par. 8 of pamphlet A.N.D.1 are not now required, as they are considered to be unnecessary for the purpose of determining the airworthiness of an airplane in normal cases. These trials would only be demanded in an abnormal case where the test flight by the official pilot showed that the behavior of the airplane in the air presented new problems which required special investigation.

E. Maintenance in an Airworthy Condition.

A Certificate of Airworthiness when granted is not valid unless the aircraft concerned is properly inspected and maintained by an authorized competent person.

This "competent person" is known as a ground engineer and is licensed as such, after examination, by the Air Ministry.

A ground engineer may be licensed as such in one or more of the following classes:

1. Inspection and maintenance of aircraft.
2. Overhaul of aircraft.
3. Inspection and maintenance of engines.
4. Overhaul of engines.

And in each case his license may be restricted to one or more types.

Examples:

(a) Inspection and maintenance of Avro 504 K.

(b) Inspection and maintenance of Avro 504 K and Le Rhone engines.

(c) Inspection and maintenance and overhaul of single-engined aircraft.

(d) Overhaul of all de Havilland types of aircraft.

(e) Inspection and maintenance and overhaul of rotary engines.

(f) Overhaul of engines, all types.

The ground engineer is an employee of the owner of the aircraft.

Inspection of the airplanes in his charge is carried out at periodical intervals by representatives of the Air Ministry. Such inspection is a better guide to the actual qualifications of the ground engineer concerned than any other form of examination, and it is also a guide as to the desirability or otherwise of extending the period for which the Certificate of Airworthiness is issued.

It is possible that insurance interests may undertake the direct supervision of ground engineers with a general supervision by A.I.D.